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ABSTRACT

This document suggests uses ways of using inventions and technologies to teach history. A list of inventions and technologies can suggest topics for student research. Books about inventions and technologies are plentiful and a good source of information for students. A field trip might be helpful, or students can interview people who are in a position to know so something about a device or process. Teachers can encourage students to make value judgments about the past, present, and future usefulness or importance of an invention or technology. In another activity, teachers can ask students to think of a current need or problem. Having identified the problem, students can brainstorm for a possible invention or technological advancement to solve the problem or meet the need. Inventions and technologies can be grouped and listed three different ways: (1) according to the name of the inventor or scientist; (2) according to the type of invention or technology such as transportation, communication, energy, materials, clothing, building or tools; or (3) chronologically. The document includes a chronological list of some 94 inventions and areas of innovation from 1730 to 1973. The items listed range from the long rifle and Franklin stove to Sputnik and Skylab. Because inventions and technologies are the devices and processes that students see around them every day, the relevancy is obvious. Students have a natural curiosity for how a device or process worked, the life story of the inventor or scientist, or the relationship of one innovation to another. Inventions and technologies are a predictably interesting way to motivate students to study history. (DK)

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Using the Study of Inventions and Technologies to Interest Students in History

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Using the Study of Inventions and Technologies to Interest Students in History

The first patent for artificial teeth went to C. M. Graham in 1822. In 1835, Samuel Colt patented the revolver. In Connecticut, in 1843, Charles Thurber invented the first typewriter. Inventions and technologies are a fascinating aspect of the study of history.

A list of inventions and technologies can suggest topics for student research. Students may see on a list of inventions and technologies a totally unfamiliar device or process and wonder what it was or how it worked. They may also be interested in finding out something more about the invention's or discovery's significance or about its impact on other social and cultural developments. Students may recognize other devices or processes on a list of inventions and technologies, but still be a little fuzzy on purpose, mechanics, and significance. Students may be very familiar with some of the devices or processes, but be totally unfamiliar with the year of the invention or discovery or with the name of the inventor or scientist. Students may also be interested in finding out something more about the inventor's or scientist's life. A list of inventions and technologies can also interest students in the relationship of one invention or discovery to another, the process of innovation, the evolution and refinement of an idea, and the need that the invention or technology served to remedy.

Books about inventions and technologies are plentiful, and they are a good source of information for students. In some cases, a field trip might be helpful, or students can interview the people who are in the position to know something about the device or process. As students

do their research, they can add other devices and technologies to their list. Teachers can encourage students to look for the origin of the button, razor, or toilet (water closet). Students may be interested in the advent of personal computers, disposable contacts, or cordless phones.

Teachers can also encourage students to make value judgements about the past, present, and future usefulness or importance of an invention or technology. Students can make decisions to differentiate between those inventions and technologies that are nice to have and those that are of paramount importance. Students might also find it interesting to rate the value of an invention or technology for its power to bring about positive versus negative results. In another activity, teachers can ask students to think of a current need or problem. Having identified the problem, students can brainstorm for a possible invention or technological advancement to solve the problem or meet the need.

Significant Inventions and Technologies

Inventions and technologies can be listed in several different ways. They can be grouped and listed according to the name of the inventor or scientist. The names of some important inventors and scientists could include Alexander Graham Bell, Carl Benz, George Washington Carver, George Eastman, Thomas Alva Edison, Michael Faraday, Enrico Fermi, Robert Fulton, Robert H. Goddard, Cyrus Hall McCormick, Guglielmo Marconi, Samuel Morse, Isaac Singer, Eli Whitney, and Wilbur and Orville Wright.

Inventions and technologies can also be grouped and listed according to the type of invention or technology. For example, inventions and technologies can be grouped under the headings of transportation (boat, roadmaking, canal lock, parachute, railways, submarine,

automobile, spacecraft), communication (ink, pencil, camera, telephone, radio, television, videotape), energy (windmill, electric motor, hydro-electricity, internal combustion engine, electronics, fuel cell), materials (ironworking, cast iron, concrete, paper, vulcanized rubber, plastics, synthetics, stainless steel), food and agriculture (fish-hook, well, plough, seed-drill, lawn-mower, refrigeration, can-opener, combine, fertilizers, insecticides), clothing (textiles, safety pin, shoe, spinning-wheel, cotton gin, sewing machine, man-made fibers, zipper), building (bricks, vaulting, cement, plywood), domestic (paint, soap, drains, bath, candle, central heating, carpet sweeper, vacuum cleaner, safety razor, washing machine, fluorescent lamp, microwave cooking, non-stick pans), health (false teeth, spectacles, false limbs, dental drill, anaesthetics, stethoscope, blood transfusion, X-ray, iron lung, kidney machine, contraceptive pill), protection (spear, umbrella, bow and arrow, gunpowder, lock and key, barbed wire, gas mask, napalm, nuclear bomb), tools (axe, winch, steam hammer, machine tools, ultrasonics), instruments (sundial, hourglass, clock, thermometer, foot-rule, telescope, electron microscope, radar), and mental aids (language, calendar, logarithms, calculating machine, computer).

Chronology is a third way of listing inventions and technologies. The following is a listing of some significant innovations.

1730-35. Thomas Godfrey improved the mariner's **QUADRANT**, an instrument used for measuring angles.

1730-40. Pennsylvania gunsmiths developed the **LONG RIFLE**. The barrel was elongated and the rifling of the bore, narrowed and improved. The rifle was an important factor in the American Revolution because of its long-range accuracy over that of the British musket. The British called it an unethical weapon because it could "kill farther than the eye could see."

Its effective range was three hundred yards, three times the range of the musket.

1742-52. Benjamin Franklin invented the **FRANKLIN STOVE** (Pennsylvania fireplace). Cast-iron sides and top greatly increased heat reflection. Whole rooms could be warmed.

1750. Jacob Yoder invented the **FLATBOAT** for inland navigation. Its flat bottom allowed for the freighting of merchandise through shallow water.

1750-60. The **CONESTOGA WAGON**, adapted to frontier travel, made its first appearance in Pennsylvania. Also called the prairie schooner, the wagon had a covered top and broad wheels. The Conestoga wagon was responsible for causing American traffic to move on the right. Early colonists had introduced the English custom of keeping to the left. The Conestoga had to be guided from the left seat. Drivers began keeping to the right in order to get a better view of the road. Other drivers soon moved to the right in order to use the deep ruts made by the Conestoga.

1775. David Bushnell built the first American **SUBMARINE**, the American Turtle.

1783. Benjamin Franklin invented **BIFOCAL GLASSES**.

1790. Jacob Perkins invented a machine to cut and head **NAILS** in one operation. Samuel Slater reproduced the Arkwright cotton **TEXTILE** manufacturing machinery at Pawtucket, Rhode Island. He was the founder of the United States textile industry.

1793-99. **FARM INVENTIONS**. Eli Whitney invented the cotton gin in 1793. Cheapening the process of refining cotton, the cotton gin separated the seeds from the cotton. Charles Newbold patented the first cast-iron plow in 1797. Eliakim Spooner invented a seeding machine in 1799.

1798. Eli Whitney invented a **JIG** for guiding tools in operation.

1805. Robert Fulton built the first marine **TORPEDO**.

1807-13. **STEAMBOATS**. John Stevens designed the first screw propeller in 1802. Robert Fulton built the first successful steamboat, the Clermont, which sailed in 1807. Stevens built the first ironclad vessel in 1813.

1807-54. **MACHINERY**. The manufacture of tacks by Jesse Reed occurred in 1807, the screw-cutting machine by Abel Stowel in 1809, the circular saw by David Melville in 1814, the profile lathe by Thomas Blanchard in 1818, the commercial vernier caliper by Brown and Sharp in 1851, and the turret lathe by Robbins and Lawrence in 1854.

1816. George Clymer invented the hand **PRINTING PRESS**.

1819. Jethrow Wood invented the three-piece cast-iron **PLOW** with standardized interchangeable parts.

1819. John Hall invented the breech-loading **FLINTLOCK**. A flint ignited gunpowder.

1826-30. **RAILROADS**. John Stevens designed a locomotive with a multitubular boiler in 1826; patented by William Howard in 1828. Robert L. Stevens invented the T-rail in 1830. The T-rail resembled the letter T because it had a head, a web, and a flat flange; it is the type of rail used with modern tracks. Stevens also devised wooden cross-ties and railroad spikes. Peter Cooper built the first United States locomotive in 1830.

1831-34. Cyrus McCormick invented the **REAPER** in 1831; patented in 1834. The reaper harvested standing grain.

1835-39. **ELECTRICAL MACHINERY**. Thomas Davenport invented the first electric motor in 1835 and the first electric printing press in 1839.

1836-43. John Ericsson improved the screw **PROPELLER** for steamships in 1836. He

designed the Princeton, the first warship to have underwater propelling machinery. He also invented the telescopic smokestack, the recoil mechanism for gun carriages, an instrument for measuring distances at sea, and gauges for fluids under pressure.

1837-40. **FARM AND MILLING**. John Deere introduced the steel plow in the United States in 1837. Hiram A. and John Pitts built early threshers. Threshers beat stalks to separate the grain from the husks.

1839. Charles Goodyear discovered the vulcanization of **RUBBER**. By treating crude rubber with sulfur and varying temperatures, either hard or soft rubber could be produced.

1840-44. **IRON AND COAL TECHNOLOGY**. David Thomas designed the hot-blast iron furnace for anthracite coal. Gideon Bast designed the anthracite coal breaker in 1840. J. and S. Battin designed rollers and crushers for coal in 1844.

1846-80. George H. Corliss invented a four-valve control system for **STEAM ENGINES**. The design resulted in the conservation of fuel. The Corliss engine weighed 680 tons and was used to provide the power for eight thousand machines in Machinery Hall at the Philadelphia Centennial Exposition in 1876. The Corliss steam engine was considered a mechanical marvel for its time.

1844. Samuel F. B. Morse put into operation the first practical **TELEGRAPH**. He invented Morse code in 1838.

1846-54. Elias Howe invented the first **SEWING** machine. Allen B. Wilson and Isaac Merritt Singer improved the machine and opened a plant in New York in 1853.

1846. Richard M. Hoe invented the rotary **PRINTING PRESS**; curved plates replaced the flat-bed press, speeding up the process and satisfying the demand.

1847-58. **FARM IMPLEMENTS**. G. Page invented the disc harrow for leveling plowed ground in 1847. John E. Heath invented the agricultural binder in 1850. John F. Appleby invented the twine knotter in 1858.

1849. Walter Hunt invented the modern **SAFETY PIN**. Henry Evans invented the pendulum press for **CAN** tops.

1851-60. **IRON AND STEEL ADVANCES**. William Kelly developed a process in 1851 for converting pig iron into steel by blowing air on molten metal. Henry Bessemer in England perfected the technic in 1856. The first Bessemer converter was built in Troy, New York, in 1864. Wrought-iron I-beams were first rolled in 1860 by Peter Cooper in Trenton, New Jersey.

1852. Elisha G. Otis invented the first passenger **ELEVATOR**, making skyscrapers possible.

1858-62. **SHOE MACHINERY**. Lyman R. Blake patented in 1858 a machine capable of sewing soles of shoes to the upper. Gordon McKay patented an improved version in 1862.

1859. Edwin L. Drake made the first successful attempt to **DRILL** for oil at Titusville, Pennsylvania.

1860. Oliver F. Winchester introduced the repeating **RIFLE**.

1862. Richard J. Gatling perfected the revolving **MACHINE GUN**.

1864. George M. Pullman built the "Pioneer," the first railroad **SLEEPING CAR**. He organized the Pullman Palace Car Company in 1867.

1865-73. Thaddeus Lowe invented the compression **ICE** machine in 1865, allowing him to make the first artificial ice in the United States. In 1873, he invented the carbureted water-

gas process. This invention was the forerunner of the modern **REFRIGERATOR**.

1865-75. William A. Bullock invented the **WEB PRINTING PRESS**, which used a web or role of paper. Andrew Campbell and Stephen D. Tucker invented a rotary press in 1875 that could print on both sides of a sheet of paper at the same time.

1868-72. George Westinghouse developed and patented the **AIR BRAKE**.

1869-99. I. W. McGaffey patented the suction-type **VACUUM CLEANER** in 1869. John Thurman patented the first motor-driven vacuum cleaner in 1899.

1869. Thomas A. Edison invented the electric **VOTING MACHINE**. First authorized use was in 1892.

1871-74. Andrew S. Hallidie invented the cable **STREETCAR** in 1871; first used in San Francisco in 1873. Stephen Dudley Field invented the first electrically powered streetcar which ran in New York City in 1874. Eli H. Janney patented the railroad **COUPLER** or interlocking jaw for connecting railroad cars.

1872-85. Dorr Eugene Felt developed and produced the first accurate comptometer or **ADDING MACHINE**.

1874. Joseph F. Glidden marketed **BARBED WIRE**.

1876-84. Alexander Graham Bell perfected the **TELEPHONE**. The first private home installation was in 1877.

1877-95. Nikola Tesla obtained the patents for the equipment that formed the system for the generation and use of **ELECTRICAL POWER**.

1878-79. **ELECTRIC LIGHTING**. Electrical outdoor arc lamps were first used in Philadelphia in 1878 and in Cleveland in 1879. In an arc lamp, light is produced between two

adjacent electrodes connected with a powerful source of electricity. Thomas A. Edison invented the incandescent bulb in 1879, a bulb made luminous by heat.

1878-1948. Thomas A. Edison patented the **PHONOGRAPH** in 1878. RCA manufactured the electronic phonograph in 1927. Dr. Peter C. Goldmark invented the 33⅓ rpm microgroove **RECORD** which was marketed in 1948.

1879. James Ritty patented the **CASH REGISTER**.

1880-88. George Eastman patented roll **FILM** in 1880 and the Kodak hand **CAMERA** in 1888.

1880-1928. The Kampfe Brothers of New York developed the safety **RAZOR**. King C. Gillette invented the first razor with throwaway blades in 1895. Jacob Shick patented the electric dry shaver in 1928.

1882-1907. **ELECTRIC APPLIANCES**. Schuyler Skaats Wheeler invented the electric fan. Henry W. Seely patented the electric iron in 1882. William S. Hadaway patented the electric stove in 1896. The Hurling Machine Company produced the electric washing machine in 1907.

1884. Lewis E. Waterman perfected the Fountain **PEN**.

1884-89. Ottmar Mergenthaler invented the **LINOTYPE** machine, thus mechanizing the work of typesetting.

1886. Elihu Thomson patented the electric **WELDING** machine; he also patented the **CREAM** separator in 1881.

1891. Whitcomb L. Judson invented the slide fastener (**ZIPPER**).

1893-1923. **AUTOMOBILE**. Charles E. and J. Frank Duryea built the first successful

United States gasoline-powered car. The Packard Motor Car Company patented the H slot gearshift (sliding gear transmission) in 1902. Sterling Elliot invented the steering knuckle in 1902. The knuckle allowed both front wheels to turn while the axle remained stationary. Pneumatic tires were invented in 1892, clincher-type tires in 1899, standard quick-demountable tire rims in 1904, the nonskid tire in 1908, cord tires in 1910, and balloon tires to reduce the shock of bumps in 1922. The Hewitt Motor Company of New York City made the first V-8 engine in 1907. Left-hand steering was developed in 1908, the electric self-starter in 1911, hydraulic brakes in 1918. Ethyl gasoline was introduced in 1923.

1893-1907. **MOTION PICTURES**. Thomas A. Edison invented the Kinetoscope (peepshow) in 1893. It used a continuous roll of film but could be viewed by only one person at a time. John Carbutt had introduced celluloid film in 1883. C. Francis Jenkins and Thomas Armat demonstrated the Vitascope, the prototype of the modern motion picture projector, in 1896. Edison developed the first sound moving picture, the Cameraphone, in 1904.

1896-1913. **AIRPLANE**. Orville and Wilbur Wright made the first air flight in 1903. Henry W. Walden invented the first American monoplane (a single wing surface) in 1909. Elmer A. Sperry demonstrated a gyroscope stabilizer on an airplane in 1913.

1898. Adolphus Busch built the first **DIESEL** engine.

1901-23. **RADIO**. Reginald A. Fessenden made an early radio transmission in 1901. Lee DeForest invented the triode amplifier (three-element vacuum tube) in 1906. He also developed the loop and direction antennae. Ernst F. W. Alexanderson invented the high frequency alternator in 1917. Shortwave broadcasting was pioneered in 1923 by Westinghouse and General Electric.

1902-09. Arthur D. Little patented **RAYON** and artificial **SILK** in 1902. Leo H. Baekeland patented thermosetting **PLASTIC** in 1909. In thermosetting, the plastic assumes a fixed shape after being molded under heat.

1913. William D. Coolidge developed a better **X-RAY** tube, revolutionizing the making of X-ray photographs. The new tube could sustain operation at 140 thousand volts. William M. Burton patented the **CRACKING** process for gasoline. Cracking is the process by which the molecular structure of petroleum is changed under pressure by heat or distillation. It produces high-octane gasoline.

1914-26. Robert H. Goddard patented the liquid fuel **ROCKET** in 1914. He directed the first rocket flight in 1926.

1918. Peter C. Hewitt and F. B. Crocker built the first successful **HELICOPTER**.

1922. Albert H. Taylor and Leo C. Young first developed **RADAR**. Herbert T. Kalmus developed **TECHNICOLOR**, whereby two or more sets of film of the same scene are photographed though different color filters and assembled in one positive film that reproduces the colors of the original scene.

1923-40. **TELEVISION**. Vladimir Zworykin demonstrated a partly electronic television in 1923. The first television transmission occurred in 1927. Peter C. Goldmark of CBS demonstrated color television in 1940.

1926-55. **AUTOMOBILE**. More streamlined bodies were introduced in 1933. The first house trailer was produced in 1929. Earl A. Thompson developed a smoother shifting transmission in 1931. Independent front-wheel suspension was introduced in 1939, tubeless tires in 1948, and puncture sealing tires in 1950. High-compression V-8 engines were introduced in

1949 as was the hardtop convertible. Power steering was introduced in 1951. Seatbelts were first offered in 1955.

1927. John D. and Mack D. Rust invented the mechanical **COTTON PICKER**.

1930-31. The Diesel engine **TRACTOR** was manufactured. In 1931, the Caterpillar tractor was developed.

1932. Edwin H. Land invented **POLAROID** glass. By polarizing light, polaroid glass could reduce glare. The polaroid camera came out in 1947. Carl C. Magee patented the **PARKING METER**.

1934. First high-speed **TRAIN**.

1934-39. Edwin H. Armstrong obtained patents for **FM RADIO** (static-free transmissions).

1938. First commercial production of **NYLON**. **FIBERGLAS** patented by Games Slayter and John H. Thomas.

1940. Chester F. Carlson invented Xerography; the first **XEROX** copier was introduced in 1959.

1942-58. British inventor, Frank Whittle, developed the **JET** engine in 1937. Jets were first tested in the United States in 1942. The Boeing 707 made the first commercial flight in 1958.

1944. Conceived by Howard H. Aiken, the Harvard Mark I was the first **COMPUTER**.

1945-54. The **ATOMIC** bomb was exploded in 1945. The U.S.S. Nautilus in 1954 was the first atomic-powered submarine.

1955. Enrico Fermi and Leo Szilard patented the **NUCLEAR** reactor.

1957-73. **SPACE.** The Russians launched Sputnik, the first artificial satellite, in 1957. Alan B. Shepard made the first manned United States space flight in 1961. On July 20, 1969, Neil Armstrong became the first man on the moon. The first United States space station was Skylab, launched, May, 1973.

CONCLUSION

Inventions and technologies are a fascinating aspect of the study of history for students. Inventions and technologies are the devices and processes that students see around them every day; the relevancy is obvious. A list of inventions and technologies can lead to many interesting questions for discussion and further research. Students would have a natural curiosity for how a device or process worked, its purpose, and significance. Many students would be interested in the life story of the inventor or scientist. Likewise, students would find an interest in the process of invention or discovery and in the relationship of one innovation to another. Questions about the value or worth of an innovation would also occur. All told, inventions and technologies are a predictably interesting way to motivate students in the study of history.

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